1. [3 pts.] An positron (positively charged) is heading downward towards the equator of the Earth, where the Earth’s magnetic field points to the north. This positron would feel a force to the

<table>
<thead>
<tr>
<th>A. North</th>
<th>B. South</th>
<th>C. West</th>
<th>D. East</th>
<th>E. None of these</th>
</tr>
</thead>
</table>

2. [3 pts.] A single strand of wire is carrying a constant current. It produces a magnetic field that

<table>
<thead>
<tr>
<th>A. is in the same direction as the current.</th>
<th>B. is in the opposite direction as the current.</th>
<th>C. is in a constant direction, perpendicular to the current.</th>
<th>D. makes circles around the wire.</th>
<th>E. makes circles that intersect with the wire.</th>
</tr>
</thead>
</table>

3. [3 pts.] A charge is moving through only a magnetic field. The kinetic energy of the charge will

<table>
<thead>
<tr>
<th>A. increase.</th>
<th>B. decrease.</th>
<th>C. remain constant.</th>
<th>D. More information is needed to complete this sentence.</th>
</tr>
</thead>
</table>

4. [8 pts.] A particle with mass \(1.67 \times 10^{-27}\) kg has a kinetic energy of \(4.90 \times 10^{-19}\) J. It moves perpendicular to a magnetic field of 0.260 T (out of the page) while going around in a circle (counterclockwise) of radius 3.08 cm. What is the charge of this particle? (Be sure to include the sign.) Hint: The kinetic energy tells you something about the motion of the charge, which should tell you something about how it reacts in a magnetic field.

\[
K = \frac{1}{2}mv^2 
\Rightarrow \quad v^2 = \frac{2K}{m} 
\Rightarrow \quad v = \sqrt{\frac{2K}{m}} 
\]

\[
F = ma 
\text{centripetal} 
\]

\[
qvB = m\frac{v^2}{r} 
\]

\[
q = \frac{mv}{Br} = \frac{m}{Br}\sqrt{\frac{2K}{m}} = \frac{\sqrt{2Km}}{Br} 
\]

5. [3 pts.] If the particle in the above problem had the same mass and velocity but more charge, the radius of the circle it traced would have been

<table>
<thead>
<tr>
<th>A. the same.</th>
<th>B. smaller.</th>
<th>C. larger.</th>
</tr>
</thead>
</table>

Note: Not really possible since this is less than \(e\).